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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,769	12/02/2003	Stuart M. Lindsay	10060298-2	3836

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EXAMINER	
LIVEDALEN, BRIAN J	
ART UNIT	**PAPER NUMBER**
2878	
MAIL DATE	**DELIVERY MODE**
08/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/725,769	LINDSAY ET AL.	
	Examiner	Art Unit	
	Brian J. Livedalen	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to amendment filed 6/28/2007. Claims 1-13 and 15 are pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites, "said sample stage being affixed to said at least one fixed support by means for causing displacement of said sample stage relative to said probe through the application of a bias voltage of 100 volts or less." The above language infers that that sample stage is affixed to a fixed support through the bias voltage. The intended relation of the amended subject matter to the rest of the claim is unclear. Correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440, see English translation) in view of Watanabe et al. (5371365).

In regard to claims 1 and 12, Funakubo discloses (fig. 1) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the stage fast scanning stage comprising, at least one fixed support (19), and a sample stage (17) having at least one axis of translation, the sample stage being affixed to the at least one fixed support by means for causing displacement (18) of the sample stage relative to the probe (page 6, lines 14-34). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage at the desired amplitude and to reduce power consumption.

In regard to claim 2, Funakubo discloses (fig. 1) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the stage fast scanning stage comprising, at least one fixed support (19), and a sample stage (17) having at least one axis of translation, the sample stage being affixed to the at least one fixed support by means for causing displacement (18) of the

sample stage relative to the probe (page 6, lines 14-34); and in which the means for causing displacement of the sample include at least one actuator element (18) supporting the stage and a sine waveform generator (fig. 4, 62) for actuating the at least one actuator element (page 5, lines 4-10; page 6, lines 1-3; page 7, lines 19-36; page 9, lines 16-28). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage at the desired amplitude and to reduce power consumption.

In regard to claim 4, Funakubo discloses (fig. 1) a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), the stage fast scanning stage comprising, at least one fixed support (19), and a sample stage (17) having at least one axis of translation, the sample stage being connected to at least one actuator element (18), a sine wave generator (fig. 4, 62) for actuating the at least one actuator element, in which the stage is displaced by the at least one actuator element being driven at the frequency of resonant vibrating corresponding to translation of the sample with respect to the probe (page 5, lines 4-10; page 6, lines 1-34; page 7, lines 19-36; page 9, lines 16-28). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a

stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage at the desired amplitude and to reduce power consumption.

In regard to claim 13, Funakubo discloses (fig. 1) a method of operating a fast scanning stage for a scanning probe microscope, the scanning probe microscope including a probe (page 3, lines 21-30), providing a sample stage (17) having a sample thereon and causing displacement of the sample on the sample stage relative to the probe by actuating at least one actuator element (18) to drive the stage at the resonant frequency of the sample stage using a sine waveform generator (fig. 4, 62) (page 5, lines 4-10; page 6, lines 1-34; page 7, lines 19-36; page 9, lines 16-28). Funakubo fails to disclose the specific voltage value applied to actuate the stage. However, Watanabe discloses a stage (2) having actuators (3,4), wherein a voltage less than 100 volts is applied to actuate the stage (column 10, lines 13-28). Furthermore, it is well known in the art to drive either a stage or probe at any desired voltage according to the size of the stage and desired amplitude. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a voltage less than 100 volts as taught by Watanabe in order to drive the stage at the desired amplitude and to reduce power consumption.

Claims 3, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) as applied to claim 2, and in view of Sarkar (6806991).

In regard claims 3 and 5, Funakubo discloses (fig. 1) a fast scanning stage wherein the sample stage has a square or rectangular configuration. Funakubo fails to disclose four actuator elements at each corner of the sample stage. However, Sarkar discloses (fig. 2) a stage that has a rectangular configuration and that has four actuator elements supporting the stage (203a-d and 201a-d) at each corner of the stage (column 4, lines 10-49). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Funakubo by placing an actuator at each corner of the stage in order to enhance the stability of the stage.

In regard to claim 6, Funakubo in view of Sarkar discloses that the actuator elements form a parallelogram scanning element.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Sarkar (6806991) in view of Watanabe et al. (5371365) as applied to claim 6, and in view of Pai et al. (6338249).

In regard to claim 7, Funakubo in view of Sarkar discloses (fig. 2) multiple actuators that translate the stage in two directions. Funakubo in view of Sarkar remain silent regarding the actuators being electrically in parallel. However, Pai discloses a system using multiple actuators (20) that are electrically in parallel to move a single

element (110) (column 3, lines 5-10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to put the actuators electrically in parallel in order to control the actuators independent from each other.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) as applied to claim 2, and in view of Erlings (US RE37560).

Regarding claim 8, Funakubo in view of Watanabe discloses a translational stage displaced by piezoelectric stack actuators (page 6, lines 21-25). Funakubo in view of Watanabe remains silent regarding the actuator being a stack-bending element. However, Erlings teaches that piezoelectric stacks are commonly used in displacing a stage for a scanning microscope (column 1, lines 17-30). It would have been obvious to one of regular skill in the art at the time the invention was made to include the stack actuators of Erlings to the translational stage of Funakubo in view of Watanabe to actuate larger displacements.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) as applied to claims 2 and 3, and in view of Zdeblick (US 4906840).

Regarding claims 9 and 10, Funakubo in view of Watanabe discloses a stage moveable by at least one piezoelectric stack actuator (page 6, lines 21-25). Funakubo in view of Watanabe is silent regarding a pzt bimorph actuator. However, Zdeblick discloses a pzt bimorph actuator (cantilever, fig 9) that actuates the tip of a probe

(column 2, lines 43-48). It would have been obvious to one of regular skill in the art at the time the invention was made to include the pzt bimorph actuator of Zbedlick to the stage of Funakubo in view of Watanabe to apply the precise movement of Zbedick's probe to the motion of the stage.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) as applied to claim 1, and in view of Marchman (US 5811796).

Regarding claim 11, Funakubo in view of Watanabe discloses (fig. 1) a scanning probe microscope with a moveable stage. Funakubo in view of Watanabe remains silent regarding the material of the stage. However, Marchman discloses a scanning microscope including a probe (column 5, line 22), and a stage (27) having at least one axis of translation and means for causing displacement of the stage relative to the probe (column 5, lines 57-column 6 line 24). Marchman further discloses the stage (disc, 27)) being made out of a ceramic material (fig 2A, column 6, lines 32-37). It would have been obvious to one of regular skill in the art at the time the invention was made to make the stage of Funakubo in view of Watanabe out of ceramic material in order to inexpensively produce a durable stage.

Claim 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Funakubo (JP 62105440) in view of Watanabe et al. (5371365) as applied to claim 13, and in view

of the publication of Ando et al (A High-Speed Atomic Force Microscope for studying biological macromolecules).

Regarding claim 15, Funakubo in view of Watanabe discloses a stage that is displaced at a resonant frequency. Funakubo in view of Watanabe is silent regarding the stage having a resonant frequency at 1/100th of the probe's frequency. Ando teaches the actuator of a scanner having a resonant frequency at 8.5 kHz, 34 kHz, and 100 kHz (paragraph entitled: Imaging Bandwidth). Ando further discloses the probe having a resonant frequency of 2.5 MHz (paragraph entitled: Discussion). This range provided for the ratio of frequencies is provides about 1/100th. It would have been obvious to one of regular skill in the art at the time the invention was made to actuate the stage and probe of Funakubo in view of Watanabe in a relationship taught by Ando to increase the imaging bandwidth.

Response to Arguments

Applicant's arguments with respect to claims 1-13 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Livedalen whose telephone number is (571) 272-2715. The examiner can normally be reached on 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bjl

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PRIMARY EXAMINER